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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/913,960      | 08/21/2001  | Yuji Kanno           | 21900/0035          | 8017             |

7590 10/27/2003

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EXAMINER

TO, BAOQUOC N

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2172

DATE MAILED: 10/27/2003

3

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/913,960

Applicant(s)

KANNO, YUJI

Examiner

Baoquoc N To

Art Unit

2172

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-29 is/are allowed.
- 6) ☐ Claim(s) \_\_\_\_ is/are rejected.
- 7) ☒ Claim(s) 1-29 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All   b) ☐ Some \*   c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_                      6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. This application is in condition for allowance except for the following formal matters:

a). The preamble of claims 1-2 and 15-16 state the preparation of mechanically searchable index; however the preamble do not state the use of preparation of mechanically searchable index. Appropriate correction is required.

b). The term mechanically searchable index does not have support in the specification. The applicant specification only support searchable index not mechanically searchable index. Appropriate correction is required.

Prosecution on the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

A shortened statutory period for reply to this action is set to expire **TWO MONTHS** from the mailing date of this letter.

### ***Allowable Subject Matter***

2. Claim 1-10 and 15-22 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: None of the prior arts in singly or in combination teach or suggest dividing N component into m sets in a predetermined method with respect to the N-dimensional real vector V of each vector data in said vector database, preparing m partial vectors V<sub>1</sub> to V<sub>m</sub>, subsequently tabulating a distribution of norm of the partial vector V<sub>k</sub> (k = 1 to m), preparing norm division table in which a norm range of a predetermined D type

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norm division is determined, calculating a region number of  $d$  to which said partial vector  $V_k$  belongs in accordance with predetermined  $D$  region center vector  $p_1$  to  $p_d$ , tabulating a distribution of a cosine  $(V_k \cdot P_d) / (|V_k| * |P_d|)$  of an angle formed by said partial vector  $V_k$  and the region Center Vector  $P_d$  as a declination distribution, and preparing a declination division table in which a declination range of the predetermined  $C$  type declination division record.

Search object range generation means for calculating a partial space number  $b$ , and a set  $(c, [r_1, r_2])$  of a declination division number  $c$  to be search in a region number  $d$  and a norm division range  $[r_1, r_2]$  from the value of an inner product  $p_d \cdot q_b$  of the region center vector  $p_d$  and said partial query vector  $q_b$ , said partial inner product lower limit value  $fb$ , and a norm division table and a declination division table in said vector index with respect to each partial query vector  $q_b$  ( $b = 1$  to  $m$ ) and each region  $b$ .

Claim 1-10 and 15-22 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: None of the prior arts in singly or in combination teach or suggest partial vector calculation means for dividing  $N$  components into  $m$  sets in a predetermined method with respect to the  $N$ -dimensional real vector  $V$  of each vector data in said sector database, and preparing  $m$  partial vectors  $v_1$  to  $v_m$ ; norm distribution tabulation means for tabulating a distribution of a norm of the partial vector  $v_k$  ( $k = 1$  to  $m$ ) among said prepared  $m$  partial vector  $v_1$  to  $m$ , and preparing a norm division table in which a norm range of a predetermined  $D$  type norm division is determined; region number

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calculation a region number  $d$  to which said partial vector  $v_k$  belong in accordance with predetermined  $D$  region center vectors  $p_1$  to  $p_b$ ; declination distribution means for tabulating a distribution of a cosine  $(v_k \cdot p_d) / (|v_k| \cdot |p_d|)$  of an angle formed by said partial vector  $v_k$  and the region center vector  $p_d$  as a declination distribution, and preparing a declination division table in which a declination range of the predetermined range of the predetermined  $c$  type declination division is recorded; norm division number calculation means for referring to said norm division table to calculate a number  $r$  of the norm division to which the norm of said partial vector  $v_b$  belongs with respect to the partial vector  $v_b$  ( $b = 1$  to  $m$ ) for the partial space number  $b$  among the  $m$  partial vectors  $v_1$  to  $v_m$  prepared by said partial vector calculation means; declination division number calculation means for calculating a declination  $(v_b \cdot p_d) / (|v_b| \cdot |p_d|)$  as a cosine of an angle formed by said partial vector  $v_b$  and the region of said region number  $d$  indicating a center direction of the region of said region number  $d$  calculated by said region number calculation means; index data calculation means for calculating index registration data to be registered in a vector index from said partial space number  $b$ , said region number  $d$ , said declination division number  $c$ , said norm division number  $r$ , the component of said partial vector  $v_b$ , and the identification number  $I$ ; and

Index constituting means for constituting means for constituting the vector index such that the identification number and the component of each partial vector can be searched using a set of the partial space number  $b$ , the region number  $d$ , the declination division number  $c$  and a norm division number range  $[r_1, r_2]$  as key from said norm division table, said declination division table, and said index registration data, and such that the

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vector component of teach vector data can be searched with the identification number of the vector component.

### ***Conclusion***

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kubo et al. (US. Patent No. 4,837,632) Patent date: 06/06/1989

Fox et al. (US. Patent No. 6,574,632) Patent date: 06/03/2003

Corey et al. (US. Patent No. 5,987,446) Patent date: 11/16/1999

Takahashi et al. (US. Patent No. 5,706,497) Patent date: 06/06/1998

Foote et al. (US. Patent No. 5,404,925) Patent date: 06/11/2002

Kiyoki et al. (US. Patent No. 6,334,129) Patent date: 12/25/2001

Yazdani et al. (Non-Patent Littérature) 1994

A Framework For Feature-Based Indexing for Spatial Databases

White et al. (Non-Patent Littérature) 1996

Similarity Indexing with SS-tree

Kim et al. (Non-Patent Littérature) 04/06/2001

An Index-Based Approach for Similarity Search Supporting Time Warping in Large Sequence Databases.

Berchtold et al. (Non-Patent Littérature) 2001

Searching in High-Dimensional Spaces—Index structure for Improving the Performance of Multimedia Databases.

**Contact Information**

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Baoquoc N. To whose telephone number is (703) 305-1949 or via e-mail BaoquocN.To@uspto.gov. The examiner can normally be reached on Monday-Friday: 8:00 AM – 4:30 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Y. Vu can be reached at (703) 305-4393.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks  
Washington, D.C. 20231.

The fax numbers for the organization where this application or proceeding is assigned are as follow:

- (703) 746-7238 [After Final Communication]
- (703) 746-7239 [Official Communication]
- (703) 746-7240 [Non-Official Communication]

Hand-delivered responses should be brought to:

Crystal Park II  
2121 Crystal Drive  
Arlington, VA 22202  
Fourth Floor (Receptionist).



KIM VU  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2100

Baoquoc N. To  
September 22, 2003